Human-AI collaboration patterns in AI-assisted academic writing

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Abstract

ABSTRACT Artificial Intelligence (AI) has increasingly influenced higher education, notably in academic writing where AI-powered assisting tools offer both opportunities and challenges. Recently, the rapid growth of generative AI (GAI) has brought its impacts into sharper focus, yet the dynamics of its utilisation in academic writing remain largely unexplored. This paper focuses on examining the nature of human-AI interactions in academic writing, specifically investigating the strategies doctoral students employ when collaborating with a GAI-powered assisting tool. This study involves 626 recorded activities on how ten doctoral students interact with GAI-powered assisting tool during academic writing. AI-driven learning analytics approach was adopted for three layered analyses: (1) data pre-processing and analysis with quantitative content analysis, (2) sequence analysis with Hidden Markov Model (HMM) and hierarchical sequence clustering, and (3) pattern analysis with process mining. Findings indicate that doctoral students engaging in iterative, highly interactive processes with the GAI-powered assisting tool generally achieve better performance in the writing task. In contrast, those who use GAI merely as a supplementary information source, maintaining a linear writing approach, tend to get lower writing performance. This study points to the need for further investigations into human-AI collaboration in learning in higher education, with implications for tailored educational strategies and solutions.